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UNITED STATES PATENT APPLICATION

FOR

**A METHOD AND SYSTEM FOR AN EXTENSIBLE CLIENT SPECIFIC
MAIL APPLICATION IN A PORTAL SERVER**

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A METHOD AND SYSTEM FOR AN EXTENSIBLE CLIENT SPECIFIC
MAIL APPLICATION IN A PORTAL SERVER

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TECHNICAL FIELD

The present invention relates generally to methods and systems for implementing electronic mail functionality for client devices. More specifically, 15 the present invention pertains to a method and system for implementing customizable and efficient cross platform electronic mail access and retrieval for portable electronic devices.

BACKGROUND ART

20 The use of Web portals has become widespread for obtaining information, news, entertainment, and the like, via the World Wide Web. A Web portal is generally a Web "supersite" that provides a variety of services including Web searching, news, white and yellow pages directories, free e-mail, discussion groups, online shopping and links to other sites. The Web portal 25 term is generally used to refer to general purpose sites, however, it is increasingly being used to refer to vertical market sites that offer the same services, but only to a particular industry such as banking, insurance or computers, or fulfill specific needs for certain types of users, for example, business travelers who are often away from their office or their primary point 30 of business.

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5 Certain types of Web portals have evolved into customized, user type specific sources of information. One example would be a corporate Web site, wherein an internal Web site (intranet) provides proprietary, enterprise-wide information to company employees as well as access to selected public Web sites and vertical-market Web sites (suppliers, vendors, etc.). Such a Web site
10 would typically include a customized search engine for internal documents as well as the ability to customize the portal page for different user groups and individuals. Access to such customized Web sites by business travelers, or other types of users who require concise prompt access to information, is a highly sought-after goal. For example, for a mobile user (e.g., business
15 traveler), it would be advantageous to obtain wireless access to a Web portal via a portable handheld device, such as a cellphone or a wireless PDA.
However, presentation of information on the small screens typical with such portable handheld devices requires customization of the Web portal and the formatting of the data it provides.

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Standards have been developed to provide a widely used method of formatting data for the smaller screens of portable handheld devices. One such standard is WML (Wireless Markup Language). WML is a tag-based language used in the Wireless Application Protocol (WAP). WML is an XML document type allowing standard XML and HTML tools to be used to develop WML applications. WAP is a standard for providing cellular phones, pagers and other handheld devices with secure access to e-mail and text-based Web pages. WAP provides a complete environment for wireless applications that includes a wireless counterpart of TCP/IP and a framework for telephony integration
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such as call control and phone book access. WAP features the Wireless Markup Language (WML) and is a streamlined version of HTML for small

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5 screen displays. It also uses WMLScript, a compact JavaScript-like language that runs in limited memory. WAP is designed to run over all the major wireless networks in place now and in the future.

10 Comprehensive, all in one, Web portals are becoming increasingly popular. Such portals attempt to provide all the services a user may typically require at a single Web site. For example, a single Web portal may attempt to provide e-mail, calendar, address book, director services (e.g., yellow pages, etc.), and the like. However, even though a Web portal may be comprehensive, a desire still exists to provide customized and tailored information in each of the 15 different categories.

20 Prior art customization processes do not provide an efficient means of customizing traditional "back end" services, such as, for example, electronic mail, in a portal environment. Customization needs to be performed with respect to the content and also the format of the presentation with respect to the type of device being used to access service. Although tools are in place (e.g., wirelessly connected portable handheld devices, WML and WAP based 25 communications standards, customized Web portals, etc.) to provide customized, application specific, information to business travelers and other various types of users via portable handheld devices, existing prior art applications and methods are still generally inadequate.

30 There currently exists no efficient mechanisms for enabling customization of applications within an HTML desktop as well as in the small display of a PDA type portal device (PDA, cellphone, or some type of target device that support some version of a markup language). For example, prior

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5 art customization processes use "top-heavy" functional processes that tend to sacrifice performance in order to allow customization. Prior art customization processes tend to accrue excessive overhead that slows down the performance of the application. This is especially so in the case of PDA type portable devices. Prior art technology for customization tends to involve extensions to
10 the markup languages such as XML, XSL, XSLT. These technologies add layers of interfaces, which can implement customization, but do so at the expense of added execution time and resource requirements.

Thus what is required, is a solution that can customize information

15 presented from a Web site or a Web portal with respect to an individual user. The required solution should enable customization of traditional back and services and information in accordance with widely used markup language communication standards. The required solution should support up customization of applications by the end user while maintaining a large degree
20 of performance scalability. The present invention provides a novel solution to the above requirements.

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5 **DISCLOSURE OF THE INVENTION**

Embodiments of the present invention provide a method and system for an extensible client specific mail application in a portal server. Embodiments of the present invention provide a solution that can customize information presented from a Web site or a Web portal with respect to an individual user.

10 The embodiments enable customization of traditional back end services and information in accordance with widely used markup language communication standards. The embodiments support the customization of applications by the end user while maintaining a large degree of performance scalability.

15 In one embodiment, the present invention is implemented as a Web portal based method for providing extensible client mail functions to a plurality of clients via the Internet. The method includes the portal server receiving a request for mail functions from a client. In response to the request, a Java server page corresponding to the request is accessed. A plurality of tags contained within the Java server page are then accessed. The Java server page is subsequently processed using the tags, wherein the tags provide access to a mail server configured for providing the mail functions. The resulting processed Java server page is then transmitted back to the client. When requests from the client are received, the Java server page corresponding to the request can be retrieved from a set of compiled Java server page classes. Extended mail functions can be provided by accessing a plurality of extended tags contained within the Java server page, wherein the mail functions are extended by adding the extended tags corresponding to new mail functionality of the mail server.

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5 In another embodiment, the present invention is implemented as a method for authoring and generating an extended Java server page for providing extensible client mail functions. The method includes the step of invoking a Java server page using a page editor application to generate a new Java server page. The page editor application is used by, for example, a Web
10 page author to update or customize information provided by a Web portal. Using the editor application, a command tag is specified to build or reference a collection of objects. A collection tag is specified that provides access to the collection. A bean tag is specified to access individual objects inside the collection of objects, wherein the command tag, the collection tag, and the bean
15 tag are configured to provide access to mail functions of a mail server. Once the author is satisfied, the new Java server page is saved and stored. The new Java server page includes both HTML content and the tags from steps b), c), and d) which provide dynamic content. Java server pages can be readily customized by customizing the tags. The tags can be selected from a tag
20 library configured to provide access to a plurality of functions of a mail server.

In other embodiments, the requests for mail functions received from a client can be received in accordance with WAP (wireless application protocol) communication standards. The resulting Java server pages are provided to, 25 for example, the wireless device, in accordance with the WAP communication standards. Similarly, the requests for the mail functions received from a client and the resulting Java server pages returned to the client can be in accordance with WML (wireless application protocol) communication standards. The compatibility with WML and WAP standards ensures compatibility with a
30 variety of different types of portable handheld devices such as cellphones, wirelessly connected PDAs, palmtop computer systems, and the like.

5 BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and form a part of this specification, illustrate embodiments of the invention and, together with the description, serve to explain the principles of the invention:

10 Figure 1A shows a client/server computer system in accordance with one embodiment of the present invention.

15 Figure 1B shows a diagram depicting the internal components of Web server and client in accordance with one embodiment of the present invention.

20 Figure 2 shows components for providing client aware detection and client aware rendering in accordance with one embodiment of the present invention.

25 Figure 3 shows a flowchart of the steps of a process for generating a Java server page in accordance with one embodiment of the present invention.

30 Figure 4 shows a flowchart of the steps of another process for generating a Java server page in accordance with another embodiment of the present invention.

35 Figure 5 shows a flowchart of the steps of a process for generating a Java server page and serving the Java server page to a client in accordance with one embodiment of the present invention.

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5 Figure 6 the shows a diagram of a computer system platform in accordance with one embodiment of the present invention.

5 **DETAILED DESCRIPTION OF THE INVENTION**

Reference will now be made in detail to the embodiments of the invention, a method for using client dependent information to customize information retrieved via a server, examples of which are illustrated in the accompanying drawings. While the invention will be described in conjunction 10 with the preferred embodiments, it will be understood that they are not intended to limit the invention to these embodiments. On the contrary, the invention is intended to cover alternatives, modifications and equivalents, which may be included within the spirit and scope of the invention as defined by the appended claims. Furthermore, in the following detailed description of the 15 present invention, numerous specific details are set forth in order to provide a thorough understanding of the present invention. However, it will be obvious to one of ordinary skill in the art that the present invention may be practiced without these specific details. In other instances, well known methods, procedures, components, and circuits have not been described in detail as not 20 to unnecessarily obscure aspects of the present invention.

Embodiments of the present invention provide a method and system for an extensible client specific mail application in a portal server. Embodiments 25 the present invention provide a solution that can customize information presented from a Web site or a Web portal with respect to an individual user. The embodiments enable customization of traditional back end services and information in accordance with widely used markup language communication standards. The embodiments support the customization of applications by the end user while maintaining a large degree of performance scalability. 30 Embodiments of the present invention and their benefits are further described below.

Notation and nomenclature

Some portions of the detailed descriptions which follow are presented in terms of procedures, steps, logic blocks, processing, and other symbolic representations of operations on data bits within a computer memory. These descriptions and representations are the means used by those skilled in the data processing arts to convey most effectively the substance of their work to others skilled in the art. A procedure, computer executed step, logic block, process, etc., are here, and generally, conceived to be self-consistent sequences of steps or instructions leading to a desired result. The steps are those requiring physical manipulations of physical quantities. Usually, though not necessarily, these quantities take the form of electrical or magnetic signals capable of being stored, transferred, combined, compared, and otherwise manipulated in a computer system. It has proven convenient at times, principally for reasons of common usage, to refer to these signals as bits, values, elements, symbols, characters, terms, numbers, or the like.

It should be borne in mind, however, that all of these and similar terms are to be associated with the appropriate physical quantities and are merely convenient labels applied to these quantities. Unless specifically stated otherwise as apparent from the following discussions, it is appreciated that throughout the present invention, discussions utilizing terms such as "processing," "storing," "accessing," "receiving," "determining," "transmitting," or the like, refer to the action and processes of a computer system, or similar electronic computing device, that manipulates and transforms data represented as physical (electronic) quantities within the computer system's registers and memories into other data similarly represented as physical

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5 quantities within the computer system registers or memories or other such
information storage, transmission, or display devices (e.g., computer system
612 of Figure 6).

Figure 1 shows a diagram of a client/server system 100 in accordance
10 with one embodiment of the present invention. System 100 depicts a server
101 communicating with a plurality of clients 102-105 via a distributed
computer network 110 (e.g., the Internet). Client 102 is a desktop computer
system coupled to the Internet via a conventional wired communications link
(e.g., Ethernet, AppleTalk, etc.). Clients 103-105 are portable-type clients
15 (e.g., a cellphone, a PDA, and a laptop computer system) and are coupled to the
Internet 110 via wireless communications links.

Figure 1 depicts the basic structure of the present invention, wherein a
server 101 is used to access electronic mail functions provided by Web server
20 101 and, for example, to access and retrieve electronic mail messages and
present the mail information in the most efficient manner possible.

In this embodiment, in addition to providing electronic mail functions,
server 101 is used to implement a general-purpose Web portal, for serving
25 information, news, entertainment, and the like, via the Internet 110 (e.g., the
World Wide Web). As such, server 101 is configured to provide a variety of
services including Web searching, news, white and yellow pages directories, free
e-mail, discussion groups, online shopping and links to other sites. In one
embodiment, server 101 can be used to implement a specifically tailored site
30 that offers particular industry services, such as banking, insurance or
computers, or fulfill specific needs for certain types of users, for example,

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5 business travelers who are often away from their office or their primary point of business.

Web server 101 can be configured to provide information formatted specifically for a mobile user (e.g., business traveler), thereby providing 10 wireless access to Web portal functions via a portable handheld device, such as a cellphone or a wireless PDA (e.g., client 102). Accordingly, Web server 101 is compatible with widely used communication standards for formatting data for the smaller screens of portable handheld devices. Such standards include WML (Wireless Markup Language) and Wireless Application Protocol (WAP).

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Referring still to Figure 1, embodiments of the present invention are directed towards the enablement of traditional "back end" services, such as electronic mail, in a portal environment. The embodiments enable the interaction with server based applications within a conventional HTML 20 desktop (e.g., client 102) as well as in the small displays of portable devices (e.g., clients 103-104). Embodiments of the present invention provide compatibility with a wide variety of different display sizes and device types by using an architecture that is compatible with the various different types of markup languages such as XML, XSL, XSLT.

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Embodiments of the present invention support a high degree of customization while maintaining scalability and performance. In contrast, prior art customization processes use "top-heavy" compatibility schemes that involve extensions to the markup languages such as XML, XSL, XSLT. Each 30 of these extensions involves layers of translation software that tend to sacrifice performance in order to allow customization. The layers accrue a

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5 large amount of overhead that slows down the performance of the application.

Embodiments of the present invention overcome these problems.

To provide customization while maintaining scalability and performance, embodiments of the present invention utilize an architecture 10 based on Java server pages and tag libraries. The Java server pages and tag libraries provide fundamental technologies used to construct the functionality of the embodiments of the present invention. A Java server page contains information required to define the look and feel of a web page as viewed by a user (e.g., via a Web browser).

15 Figure 1B shows a diagram depicting the internal components of Web server 101 and client 104 in accordance with one embodiment of the present invention. As depicted in Figure 1B, Web portal 101 includes a Web server application 201 for serving Java server pages to a plurality of clients, wherein 20 one such client 104 is shown.

Web server 201 accesses Web pages, particularly Java server pages, from a set of stored, compiled Java server pages (or classes) 210. The Java server pages 210 utilize tags from a plurality of tag libraries 221-225. The tag 25 libraries 221-225 contained tags specific with respect to their imparting functionality. For example, utility tag library 221 contains utility tags, mail tag library 222 contains mail tags, calendar tag library 223 contains calendar tags, and so on. The tags of the various tag libraries 221-225 are used to provide functionality from a group of servers 231-236. In this embodiment, the 30 components 201-236 are software based components executing on the Web portal 101 computer system platform.

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Client 104 executes a Java virtual machine 204 for interpreting information received from the Web server 201 and generating the corresponding graphical presentation to the user (e.g., via a Web browser). The Java virtual machine 204 executes Java code provided by Web server 201. As 10 is well known, Java and Java compatible virtual machines provide cross platform portability of software based functions.

Referring still to Figure 1B, the term "Java server page" (or JSP) generally refers to an extension to the Java servlet technology from Sun™ 15 that provides a standardized programming vehicle for displaying dynamic content on a Web page. For example, a typical JSP includes both HTML and embedded Java source code that is executed in the Web server 201. The HTML provides the page layout that will be returned to the client 104 and the Java provides the processing, for example, to deliver a query to one of the servers 231-236 and fill in the blank fields with the results. In a typical 20 implementation, initially accessed JSPs are compiled into bytecode (e.g., into a servlet) when first encountered and are stored with the rest of the compiled JSP classes 210.

25 It should be noted that the components of the Web server 101 depicted in Figure 1B are compatible with J2EE (Java 2 Platform, Enterprise Edition) technology developed by Sun™. J2EE comprises a platform for building Web-based enterprise applications.

30 Referring still to Figure 1B, a typical operation of Web portal 101 is now described. In providing mail functionality to the connective clients, Web portal

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5 101 receives a request for mail functions from a client, in this case client 104. In response to the request, Web server 201 accesses a Java server page corresponding to the request from the compiled Java server page classes 210. A plurality of tags contained within the Java server page are then accessed. The Java server page is subsequently processed using the tags, wherein the 10 tags provide access to a mail server 235 configured for providing the mail functions. The resulting processed Java server page is then transmitted back to the client 104.

It should be noted that the requests for mail functions received from 15 client 104 can be received in accordance with WAP (wireless application protocol) communication standards. The resulting Java server pages are provided to, for example, the wireless device 104, in accordance with the WAP communication standards. Similarly, the requests for the mail functions received from a client and the resulting Java server pages returned to the 20 client can be in accordance with WML (wireless application protocol) communication standards. The compatibility with WML and WAP standards ensures compatibility with a variety of different types of portable handheld devices such as cellphones, wirelessly connected PDAs, palmtop computer systems, and the like.

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Figure 2 shows components for providing client aware detection and client aware rendering in accordance with one embodiment of the present invention. A client aware detection component 261 and a client aware rendering component 262 access a set of Java server page hierarchy rules 263 in order to format information for particular requirements of, for example, 30 portable handheld devices.

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To facilitate compatibility with WML and WAP enabled portable handheld devices such as cellphones, wirelessly connected PDAs, palmtop computer systems, and the like, embodiments of the present invention can implement client aware rendering wherein the information is formatted and sized specifically for the smaller display sizes of portable devices. This functionality involves the step of detecting the particular type of client device requesting the information (performed by the detection component 261) and rendering the information specifically for that type of client (performed by component 262). The information provided by components 261-262 are then used to access a hierarchy of Java server page rules that specify, for example, which versions of pages are served to particular versions of clients (e.g., types of cellphones, PDAs, types of displays, color vs. black and white, etc.). A resulting page is then selected from the page classes 210 and served to the client 104.

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Figure 3 shows a flowchart of the steps of a process 300 for generating a Java server page in accordance with one embodiment of the present invention. Process 300 shows the steps involved in authoring and generating an extended Java server page for providing extensible client mail functions.

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Process 300 begins in step 301, where a Java server page is invoked using a page editor application to generate a new Java server page. The page editor application is used by, for example, a Web page author to update or customize information provided by a Web portal. In step 302, a mail service context is specified for the process 300. In step 303, using the editor application, a command tag is specified to build or reference a collection of

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5 objects. In step 304, a collection tag is specified that provides access to the collection. In step 305, a bean tag is specified to access individual objects inside the collection of objects, wherein the command tag, the collection tag, and the bean tag are configured to provide access to mail functions of a mail server.

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Once the author is satisfied, the new Java server page is saved and stored. The new Java server page includes both HTML content and the tags which provide dynamic content. Java server pages can be readily customized by customizing the tags. The tags can be selected from a tag library 15 configured to provide access to a plurality of functions of a mail server.

Thus, embodiments of the present invention include three basic types of tags, the command tags, the collection tags, and the bean tags. The tags present a method for abstracting information. Tags utilize the fact that 20 information can be represented as collections. For example, collection tags function by grouping items into logical or related sets. Command tags function by initiating the building of the collection of objects or items. Bean tags function as pointers to the elements or individual items/objects of a collection. Accordingly, a typical invocation sequence can involve the specification of a 25 command tag that builds or references a collection, a collection tag that accesses that collection, and accessing each element within the collection using a bean tag.

The tags thus provide a means of easy extension and customization of 30 functions provided by Web portal 101. For example, extended mail functions can be provided by accessing a plurality of extended tags contained within the

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5 Java server page, wherein the mail functions are extended by adding the extended tags corresponding to new mail functionality of the mail server 235.

It should be noted that the term "bean" is substantially similar to the term "JavaBean" defined by Sun™ as a component software architecture 10 that runs in the Java environment. JavaBeans are independent Java program modules that are called for and executed. They have been used primarily for developing user interfaces at the client side. The server-side counterpart is Enterprise JavaBeans. Both types of "beans" are part of the J2EE platform.

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Figure 4 shows a flowchart of the steps of another process 400 for generating a Java server page in accordance with another embodiment of the present invention. Process 400 shows the steps involved in authoring and generating an extended Java server page for providing extensible client mail 20 functions, wherein an existing Java server page is modified by a Web administrator.

Process 400 begins in step 401 where an administrator logs into the Web server 201 with administrator privileges (e.g., logs in with administrator's 25 password, or the like). In step 402, the administrator selects an existing Java server page for modification. The page can be modified, for example, to update information displayed, alter the format of the displayed information, completely replace the information, or the like. In step 403, the administrator references the corresponding tag libraries (e.g., libraries 221-225) within the 30 data structure of the Java server page being edited or modified. Due to the architecture of the present invention, this editing process is straightforward

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5 and relatively easy for novice users. For example, the editing process is more analogous to "web page authoring" as opposed to "programming" as required by typical prior art dynamic web page maintenance processes. Subsequently, in step 404, the new Java server page including modifications is stored.

10 Figure 5 shows a flowchart of the steps of another process 500 for generating a Java server page and serving the Java server page to a client in accordance with one embodiment of the present invention. Process 500 shows the steps involved in serving a Java server page as performed by a Web portal (e.g., Web portal 101 of Figure 1) in accordance with one embodiment of the 15 present invention.

Process 500 begins in step 501, where a Web server (e.g., Web server 201) within the Web portal receives a Java server page from a set of compiled Java server pages (e.g., the compiled Java server page classes 210). In 20 response to the Java server page, the Web server establishes the context for the tags and/or objects encountered within the Java server page. In step 502, a command tag within the Java server page is processed to create a collection. In step 503, a collection tag within the Java server page is processed to give 25 reference to the collection. As shown in step 510, this collection can include, for example, collections of mail folders, collections of mail messages, collections of lines of text of individual mail messages, and the like. In step 504, one or more bean tags are processed to give reference to the singular contents of the collection (e.g., and individual mail folder, and individual mail message, or the like). In step 505, the resulting Java server page is then served to the client.

5 In this manner, the HTML of the Java server page provides the basic page layout of the information returned to the client while the tags and the corresponding Java code are executed on the Web server in order to provide back-end functionality (e.g., of the servers 231-236) to provide the information requested by the client (e.g., mail information).

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Thus, embodiments of the present invention provide a method and system for an extensible client specific mail application in a portal server. Embodiments the present invention provide a solution that can customize information presented from a Web site or a Web portal with respect to an 15 individual user. The embodiments enable customization of traditional back end services and information in accordance with widely used markup language communication standards. The embodiments support the customization of applications by the end user while maintaining a large degree of performance scalability.

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Computer system environment

Referring to Figure 6, a computer system 612 is illustrated. Within the above discussions, certain processes and steps are discussed that are realized, in one embodiment, as a series of instructions (e.g., software program) that reside 25 within computer readable memory units of system 612 and executed by processors of system 612. When executed, the instructions cause computer system 612 to perform specific actions and exhibit specific behavior which was described in detail above.

30 Specific aspects of the present invention are operable within a programmed computer system which can function as a client or server machine. A generalized

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5 example of such a computer system operable to implement the elements of the present invention is shown in Figure 6. In general, the computer system of the present invention includes an address/data bus 600 for communicating information, one or more central processor(s) 601 coupled with bus 600 for processing information and instructions, a computer readable volatile memory unit 10 602 (e.g., random access memory, static RAM, dynamic RAM, etc.) coupled with bus 600 for storing information and instructions for the central processor(s) 601, a computer readable non-volatile memory unit 603 (e.g., read only memory, programmable ROM, flash memory, EPROM, EEPROM, etc.) coupled with bus 600 for storing static information and instructions for processor(s) 601. System 15 612 can optionally include a mass storage computer readable data storage device 604, such as a magnetic or optical disk and disk drive coupled with bus 600 for storing information and instructions. Optionally, system 612 can also include a display device 605 coupled to bus 600 for displaying information to the computer user, an alphanumeric input device 606 including alphanumeric and function keys 20 coupled to bus 600 for communicating information and command selections to central processor(s) 601, a cursor control device 607 coupled to bus for communicating user input information and command selections to the central processor(s) 601, and a signal input/output device 608 coupled to the bus 600 for communicating messages, command selections, data, etc., to and from 25 processor(s) 601.

The foregoing descriptions of specific embodiments of the present invention have been presented for purposes of illustration and description. They are not intended to be exhaustive or to limit the invention to the precise 30 forms disclosed, and obviously many modifications and variations are possible in light of the above teaching. The embodiments were chosen and described in

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5 order best to explain the principles of the invention and its practical application, thereby to enable others skilled in the art best to utilize the invention and various embodiments with various modifications as are suited to the particular use contemplated. It is intended that the scope of the invention be defined by the Claims appended hereto and their equivalents.